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MADRAS RECORD OFFICE

Government of Madras

Public Works

DEPARTMENT

G.O. No.	395-96	Press	<i>Original</i>
B.P. No.		Misr	
Dated	12. 2	1951	18/5

Not to be folded or roughly handled

No. 282. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 22nd January 1875, No. 56 :—

IN compliance with the instructions contained in the Order of Government, dated the 4th ultimo, No. 3,411-A, I have the honor to submit a detailed statement of the injury sustained by the Railways in this Presidency during the floods of September and October 1874. The statement shows the nature and extent of damage done to every work which suffered from the floods, and the cost of the necessary repairs. Cases of trifling injury to the earthwork and ballast have been omitted. In some instances it is not at present possible to state, even approximately, the cost of securing the railway against the effects of floods of such exceptional magnitude as were encountered during last year. I refer to such works as the bridge over the Penankeney on the Bangalore branch, and the bridges over the Cheyair and Paupugnee on the North-West Line, in which cases it is almost certain that additional waterway will be required.

2. The area over which the effects of the floods were felt was extensive. With regard to the Madras Railway the western limit seems to have been, on the South-West Line, the 145th mile, about midway between the Tripatore and Samulputty stations; on the Bangalore branch, the 204th mile, near the Cadjoody station; and on the North-West Line, the 234th mile, midway between the Tadputri and Royalcherroo stations. Upon the South Indian Railway, the only portion of the open line which suffered was the short branch between Arconum and Conjeveram, but the works under construction on the Madras-Cuddalore line were also considerably retarded by the heavy rains. The floods from which the railways suffered the greatest injury seem to have been caused by extraordinary heavy rains in the southern taluqs of the Cuddapah and Bellary Districts, and in the eastern part of the Mysore territory. Over this area the rainfall, during September and October, seems to have averaged more than 30 inches, and it must be borne in mind that this was after unusually heavy rains during the earlier months, and that in most places the soil was saturated and the reservoirs filled before the September rains began to fall. In some instances the disastrous effects of the heavy rainfall were aggravated by the bursting of large reservoirs. Among these may be mentioned the Holali and Ooscottah tanks in Mysore, the Chintagoonta tank in Cuddapah, and the Dhurmaveram tank in Bellary. There is also reason to believe that the destructive flood in the Goriattum River was due in great measure to the bursting of large reservoirs within the Poonganoor Zemindari, but the effects of the heavy rains in this and other private estates have not yet been ascertained.

3. With regard to the loss resulting from these floods, I have arrived at the conclusion that the cost of repairing the damages sustained by the open lines will be covered by three lakhs of Rupees. It is not easy to form an accurate estimate upon this point, inasmuch as the missing material on the North-West Line is of great value, and it is uncertain how much of it will ultimately be recovered and found fit for use: but after careful consideration, the above is the figure at which, in my opinion, the cost of repairing the damaged works may fairly be set down. The loss sustained upon works under construction may be estimated at about

Rupees 50,000; giving a total of Rupees 3,50,000. To this should be added the loss arising from the interruption to traffic, an item by no means easy to arrive at; but by careful comparison between the receipts during the period affected by the interruption, those for the period immediately preceding it, and those for the corresponding period in 1873, a falling off of two and a half lakhs is arrived at, which may not improperly be charged to the effects of the floods. It may therefore be roundly stated that, under the head of repairs and loss of traffic, the loss caused to the State by these floods, so far as the railways are concerned, amounts to six lakhs of Rupees, without taking into consideration the provision of additional waterway, which the experience of 1874 may show to be necessary.

4. In submitting this report there are two points connected with these disasters to which it is my duty to draw special attention. One is that, in the midst of all these calamities occurring at widely distant points over such an extensive area, no instance of an accident to a train has occurred; and the fact that the lives and limbs of passengers have been preserved from injury may fairly be placed to the credit of the railway staff, especially the line watchmen, a body of men who have not always distinguished themselves on similar occasions, but whose conduct during the recent floods is, in my opinion, deserving of high praise. The other point to which I desire to draw attention is the rapidity with which the temporary repairs have been executed, and communication restored along the line. In the case of the Goriattum bridge the exertions of Mr. Carter, the Engineer in charge, have already received recognition from Government; but the work done by the officers in charge of the large bridges on the North-West Line deserve special mention. In the cases of the Cheyair, Paupugnee, and Chittravutty Rivers, the immediate repair of the damaged bridges was out of the question, and the construction of temporary roads across the beds could not be begun until the water in each river had subsided. The road across the Cheyair was completed by Mr. West on the 16th instant, and the roads across the Paupugnee and Chittravutty were completed by Mr. Haworth on the 18th, on which date through traffic between Madras and Raichore was resumed. It is with pleasure that I am able to bear witness to the exertions made by those officers in order to insure this result. The obstacles which they had to encounter were not slight.

Detailed statement of the injury caused to the Railways in the Madras Presidency by the floods of September and October 1874.

1. Upon the 17th September, the large stream which is crossed by the Madras Railway, Bangalore Branch, 204th mile. Railway near the Cadjoody station, on the Bangalore branch, rose to an unusual height, and carried away a masonry 6 feet culvert, situated near the 204th mile. The railway embankment was washed away for a distance of about 85 feet, and the bridge over the main stream, consisting of five 30 feet arches, was for a time in some danger. The stream is known indifferently by the names of Panar, Pennar, and Penankeney; while near Cuadalore, where the South Indian Railway crosses it, it is known as the Pooniar. A temporary bridge, consisting of two 30 feet girder openings, was erected in the gap; and communication was restored upon the 28th

September, having been interrupted for twelve days. The sudden rise in the river seems to have been due solely to excessive rain, and inquiries are still being made in order to determine whether the provision of waterway is sufficient.

Upon the 17th October this bridge was again in danger, as fears were entertained for the safety of the Ooscottah tank. In order to save the bridge a breach was cut in the railway embankment, and was closed again on the 18th, when danger had passed.

The expenditure incurred in these operations has been Rupees 1,434; but, until the question of waterway has been settled, it is impossible to state what outlay may be necessary to provide against similar contingencies.

2. Upon the 28th September considerable damage was caused to part of the South-West Line, between the 133rd and 145th miles, by the breaching of several tanks near Tripatore in consequence of the heavy rain. The floors of a 15 feet arch in the 135th mile, and of a 20 feet arch in the 144th mile, were carried away. Two 3 feet arches in the 135th mile also sustained damage; and in the 136th mile the entire ballast was washed away for a considerable distance, leaving the rails suspended.

The cost of repairing this damage amounted to Rupees 1,798.

3. Upon the 24th October considerable damage was caused to the short line between Arconum and Conjeveram, now forming part of the South Indian Railway, Conjeveram Line. In the 3rd mile the wing walls and flooring of a bridge of two 14 feet girder openings were carried away; and at the Cortilliar bridge, where the water rose to the bottom of the girders, the approaches sustained some injury. In the 14th mile a bridge of three 14 feet openings was destroyed. In the 6th and 7th miles there were numerous breaches in the railway embankment; and throughout the line the ballast suffered severely.

Communication was interrupted from the 24th October until the 4th November.

The cost of repairing the damage has been Rupees 1,384; but it will probably be found necessary to incur further expense in increased waterway with a view to provide against similar disaster in future.

4. Upon the 24th and 25th October the old bridge over the Cheyair sustained considerable damage. This bridge consisted originally of thirty-eight 70 feet openings, spanned by wrought iron girders resting on masonry piers. It was divided into two unequal portions by an island embankment about 200 yards in length. During the flood, in October 1870, seven piers in the south portion of the bridge were carried away; and, pending the construction of the new bridge which was then decided on, these were replaced by eight piers formed of screw piles. During the night of the 24th October 1874, the water in the Cheyair rose to an unprecedented height; the masonry piers were topped, and the lower plates of the girders submerged. The damage sustained by the bridge may be thus sum-

*Proceedings of the Madras Government, Public Works Department,
12th February 1875.*

marized:—one masonry pier in the south portion, and four in the north portion, destroyed; the two abutments of the island destroyed, and about 80 yards of the embankment between them carried away; two screw pile piers in the south portion forced slightly down stream; and two sets of iron girders, 140 feet in length, carried away. Some idea of the great force exerted by the current may be gathered from the fact that these sets of girders, each weighing about 27 tons, were found imbedded in the sand, the one about three quarters of a mile, and the other about a mile and a half, below the bridge.

After the occurrence of the accident to this bridge in October 1870, its foundations were examined and condemned, and the construction of a new bridge was determined on. There can be no doubt that the damage now reported was due solely to the effect of a tremendous scour upon insufficient foundations. That the flood in the river, and its effects, were quite out of the ordinary course, will be seen from the following statistics of the rainfall taken at different points within the Cheyair basin:—

Stations at which rainfall was registered.	RAINFALL IN INCHES DURING			
	September 1874.	October 1874.	September and October 1874.	23rd, 24th, and 25th October 1874.
Wontimitta	...	...	...	...
Pullumpett	17.42	17.34	34.76	13.90
Goolcherroo	9.44	25.48	34.92	22.95
Peelair	15.65	15.57	31.22	13.40
Madanapilly	10.80	18.60	29.40	13.80
	13.60	16.50	30.10	6.55

The screw pile piers, which are stated to have been forced slightly down stream, rested on rock at a depth of about 17 feet. In such a comparatively shallow bed of sand the use of screw piles was resorted to upon economical grounds, only as a temporary measure, pending the completion of the new bridge.

It is now proposed to rebuild, for a single line of rails, the masonry pier which was carried away in the south portion of the bridge; to replace the four fallen masonry piers in the north portion with screw piles; to form the south abutment of the island by supporting cross girders upon the uninjured wing-walls of the old bridge; to replace the north abutment of the island with screw piles; to replace in their proper position the screw pile piers which were forced down stream; and to substitute new girders for those carried away. It should be understood that these are all temporary measures intended to prevent interruption to the traffic during the construction of the new bridge. It is expected that these repairs will be finished by May 1875, and in the interval trains pass along a temporary road laid across the bed of the river. This temporary road was opened for traffic upon the 14th instant, communication having been interrupted since the 24th October, for a period of eighty-two days.

The estimated cost of the repairs to the old bridge amounts to Rupees 61,072; but it must be observed that in this is included an item of Rupees 27,489 for new girders; and that this sum, or part of it, will be credited to the estimate if the

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missing girders are capable of future use. The cost of the temporary road across the bed of the Cheyair is estimated at Rupees 3,000.

5. The new bridge across the Cheyair, now under construction, was also somewhat injured upon the 24th and 25th October 1874. This bridge was designed to consist of forty-six 70 feet openings, spanned by wrought iron girders; the island embankment, which divided the old bridge, being removed. The two abutments and thirteen of the piers are of masonry, the other piers being formed of cast iron cylinders sunk through the sand into the rock. The whole of the masonry, according to the original design, has been completed; and it is satisfactory that it withstood, securely and without injury, the unprecedented floods of last year. Of the cylinder piers, in No. 14, both cylinders have bent over down stream, making an angle of about 15° with the vertical. In Pier No. 22 the east cylinder, and in No. 24 the west cylinder, have also bent over, but more slightly. These cylinders had been sunk through the sand to rock, but they had not been imbedded in the rock, and had not of course been filled with concrete.

During the late floods the bed of the river was greatly disturbed, and its outline has been altogether changed, a large quantity of material being buried deeply in the sand. It is hoped that much will be recovered; but still the loss under this head will probably be considerable, as large heaps of material prepared for making concrete were swept away.

It is estimated that the cost of repairing the damage sustained by the bridge will amount to about Rupees 7,500. The value of the material buried and carried away is about Rupees 20,000; but it is hoped that most of this may be recovered.

The question of providing additional waterway is under consideration. It will probably be necessary to add two openings at the south end of the bridge, and to raise the piers by about 3 feet. This will of course increase the cost of the new bridge, but to what extent cannot now be stated.

6. The damage occasioned by the flood in the Cheyair was not confined to the old and new bridges. The river spread far beyond its usual banks, and Madras Railway, North-West Line, 135th mile. On the approaches to the bridge, both north and south, were considerably injured. On the south side the flood water was carried across country and along the railway embankment for nearly a mile, forcing its way over the bank in the 135th mile, where the line was completely obliterated for a distance of about 200 yards, fortunately without injury to any masonry work.

The cost of repairing this damage was Rupees 3,237, and the work was completed by the 12th November, communication having been interrupted over this part of the line for nineteen days.

7. Upon the 24th and 25th October the line to the south of the Cheyair was also severely damaged in consequence of the heavy rains. Madras Railway, North-West Line, 71st to 132nd mile.

In the 71st mile the revetment round the screw pile abutment of a 50 feet girder bridge slipped, as well as part of the embankment. This was roughly repaired upon the same day.

In the 82nd mile the north-west wing-wall of a 9 feet arched bridge was carried away, and the slope of the embankment scoured. A temporary dike on of the line was immediately made.

In the 86th mile the line runs through the Kurumbady tank, and some considerable slips occurred in the railway bank, which were however filled up on the same day.

In the 97th mile there was a heavy stream flowing through the Ballapilly cutting. The water was 2 feet deep, and the ballast was carried away, but the damage was soon repaired.

In the 107th mile the embankment was seriously injured for a distance of 500 yards by the bursting of a tank. In one place the bank was entirely swept away for 20 yards.

In the 108th mile there was a bad slip in the bank behind the south abutment of the Codoor bridge, but this was soon repaired.

In the 131st mile a breach of 70 yards in length was made in the railway bank close to a 12 feet arch. This breach was caused by the bursting of the Munoor Ketchemah tank, which lies close above the line. Communication over this breach was not restored until the 12th November, after an interruption of nineteen days.

In the 132nd mile the bank was much damaged in consequence of a second breach in the Munoor Ketchemah tank. The water flowed over the line, and left gaps of from 10 to 30 yards in length. The flood from the tank was increased by some breaches in a neighbouring channel; but fortunately none of the masonry works were injured. The running of trains over this part was also resumed on the 12th of November.

The cost of making good the injuries enumerated above amounted to Rs. 1,620.

8. The bridge over the Paupugnee was greatly damaged by the flood in that Madras Railway, North-West Line, 175th mile. river upon the 24th and 25th October. This bridge originally consisted of twenty 70 feet openings, spanned by wrought iron girders resting on screw pile piers, the abutments being of masonry. One pier and one set of girders were seriously injured by the accident to the Inspection Train in June 1874, and the damage was temporarily repaired with short girders supported on piers of wooden sleepers. The floods of October carried away four screw pile piers, with two sets of 140 feet girders resting on them; and the temporary piers of wooden sleepers were also swept away. None of the screw piles or girders have yet been discovered although careful search has been made. The probability is that, as in the case of the Cheyair, the girders have been carried to a great distance down stream, and that the piles will be found deeply buried in the sand near the bridge.

There can be no doubt that the damage sustained by this bridge arose from the insufficiency of the waterway to pass off with safety a flood of such exceptional magnitude. During nine years the bridge withstood all the floods in the river, some of which were very heavy; but the rainfall in October was quite extraordinary; and the water, stopped in its course by the railway banks, seems to have spread over the country to a width of fully three miles. The result was a tremen-

dous scour in the sandy bed at the bridge, carrying away the piles, which had been screwed down to the rock, at what was deemed a perfectly safe depth.

Communication across the Paupugnee was restored upon the 18th instant, having been interrupted since the 24th October, a period of eighty-five days. For the present trains run over a temporary road laid across the river bed, the cost of constructing which has been about Rupees 3,000.

It is now proposed to restore all the screw pile piers which suffered, and to replace the missing girders. The estimated cost amounts to Rupees 71,616; but it should be observed that this sum includes the cost of repairing the damage sustained by the bridge during both June and October. It also includes items, amounting to Rupees 54,744, for new girders and new piles to replace those not yet recovered from the bed of the river; and it may be expected that the estimate will ultimately be credited with a large part of this.

The question of an increase to the waterway remains for consideration. There can be no doubt that the bridge, as it stands, is insufficient to cope with floods of such exceptional character as that which it encountered in October. If it be determined that provision is to be made against such extraordinary casualties, it will probably be found advisable to rebuild the bridge, a measure which will necessarily be very costly.

9. The flood in the Paupugnee which, as above stated, spread over the Madras Railway, North-West Line, 174th mile. country for a width of three miles, inflicted considerable injury upon the railway embankment south of the bridge. In the 174th mile two 6 feet culverts suffered, one being completely washed away. Breaches were also made in the embankment in the 174th and 175th miles.

The cost of repairing these damages has been about Rupees 2,700.

10. On the 25th October the bridge over the Chittravutty sustained very serious injury. It consisted of forty 70 Madras Railway, North-West Line, 212th mile. feet openings, spanned by wrought iron girders. The abutments and ten piers at each end were of masonry, the remaining nineteen piers being formed of screw piles. The masonry piers were founded either upon hard clay, or on brick wells carried down into the clay. The flood of the 25th October carried away nine of the ten masonry piers near the south abutment. Two sets of 140 feet iron girders have disappeared, and two sets have been much twisted and damaged.

The damage appears to have been solely due to the insufficiency of the foundations to withstand the scour caused by the extraordinary flood. The Chief Engineer of the Company was on the spot while the flood was at its height, and he describes it as something quite beyond the range of his experience. Not only was the river full from bank to bank, but, from some cause or other, the current seems to have set across the bed from north to south. When the subsidence of the water in the river allows the foundations to be examined, it will perhaps be more easy to form a satisfactory opinion as to the cause of their failure. So far as can be ascertained, the flood in the river was caused not only by the heavy rainfall but by the bursting of large tanks in the Bellary district.

It is proposed to replace all the ruined piers with screw piles, and to substitute new girders for the missing and damaged ones. The cost is estimated at Rupees 1,10,746; but in this is included an item of Rupees 57,298 for new girders, and it is expected that a large part of this will ultimately be credited.

In the meantime communication has been restored by the construction of a temporary road across the river bed, the cost of which has been Rupees 3,000. The running of trains was resumed upon the 18th instant, after an interruption of eighty-five days.

11. Upon the 25th October the bridge over the Pennair was also damaged. Madras Railway, North-West Line, 234th mile. It consisted of twenty-four 70 feet openings, spanned by wrought iron girders resting on masonry piers and abutments. The masonry was founded either upon hard kunker, or upon brick wells carried down to the kunker. The October floods destroyed two piers near the north abutment, but fortunately without injury to the girders; and temporary piers of wooden sleepers having been erected, traffic over the bridge was resumed upon the 14th December after an interruption of fifty days.

In order to restore the ruined piers without interfering with the running of trains, it has been decided to sink five screw piles in a row on either side of each of the two temporary sleeper piers, the rows of piles at each pier being 24 feet apart. Two pairs of 26 feet girders, resting upon the piles, will support the main girders of the bridge, and the sleeper piers will then be removed, so as to allow the new masonry piers to be built while trains are running over the bridge. The estimated cost amounts to Rupees 10,762, and the cost of the temporary repairs came to about Rupees 3,000.

The failure of the two piers in this bridge seems to have been due to the same cause to which the destruction of the Chittravutty piers has been attributed, viz., the insufficiency of the foundations to cope with the tremendous scour. No trouble was spared to carry the foundations down to what was supposed to be a safe depth, and it now remains a question for consideration whether it is necessary to adopt measures for protecting the foundations.

12. The temporary bridges near Mailputty and Vaniembady, which were Madras Railway, South-West Line, 106th and 124th mile. constructed to carry the traffic during the rebuilding of the two bridges destroyed early in May 1874, were damaged by the heavy rains of the 25th October and rendered impassable for trains.

The damage was at once repaired at a cost of Rupees 475, and communication across the temporary bridges was restored upon the 28th October, after an interruption of four days.

13. Upon the 26th October the bridge over the Goriattum was severely Madras Railway, South-West Line, 98th mile. damaged. It consisted of two portions divided by a small island embankment about 50 yards in length. The eastern portion consisted of twenty-four 30 feet arches on a skew of 60°, and the western portion of five 30 feet arches on the square.

These five arches were entirely destroyed upon the 26th October, and it is now proposed to rebuild them, and to re-place the island embankment by two 30 feet arches and one irregular opening spanned by wrought iron girders, uniting the square and skew portions of the bridge. The estimated cost is Rupees 42,111, but the actual expenditure entailed by the accident is considerably below that sum.

Upon the recommendation of the Committee appointed by Government to examine the foundations of the Madras Railway bridges, a sum of Rupees 80,449 was sanctioned during 1873 for the construction of certain protective works at the Goriattum bridge. During 1874 the weather was singularly unfavorable for carrying out such works in the beds of rivers, and the floods of last October found the western portion of the bridge entirely unprotected. In rebuilding the bridge it is intended to carry the foundations down to rock, and a large part of the sanctioned protective works will thus be rendered unnecessary. It is expected that this will effect a saving of Rupees 18,133; so that, in estimating the cost of the damage caused by the flood, the actual expenditure incurred in rebuilding the bridge may be reduced by that sum, leaving Rupees 23,978 as the cost of restoring the bridge, and of providing 100 feet of additional waterway.

Communication across the river was temporarily restored on the 5th November, after an interruption of eleven days, by constructing piers of wooden sleepers, and spanning the openings with short girders. The cost of this amounted to Rupees 6,100. A temporary road has been subsequently constructed across the entire bed of the river, at a cost of Rupees 2,500, in order to allow the permanent restoration of the bridge being proceeded with. This temporary road was opened for traffic upon the 8th instant.

14. Upon the 30th October, 4 miles of the railway lying immediately to the north of Moodanoor station were Madras Railway, North-West Line, 196th to 200th mile. breached in many places and rendered completely impassable, in consequence

of the breaching of the Chintagoonta tank, a large reservoir lying to the west of the line. This tank was known to be in a dangerous state, and preparations had been made for relieving it by cutting the bund; when, suddenly, on the night of the 30th October, it gave way, and its contents rushed over the country and across the railway at numerous points between the 196th and 200th mile. The principal outlet from the tank is crossed by the railway within the Moodanoor station yard, by a bridge of three 30 feet girder openings; and at this point the railway bank had been cut, as soon as the tank was known to be in danger, in the hope of saving the bridge. The measure was fortunately successful; and all the other masonry works within the 4 miles affected by the inundation were in like manner saved from destruction by the water finding its way over the railway bank in all places. But with the exception of the bridges and culverts, the whole of the railway within those four miles may be said to have been swept away, ballast, earthwork, and fencing; the rails being carried in some places to a distance of nine and ten yards from where they had been placed. For those who had no opportunity of seeing this part of the railway before the completion of the repairs, it would be difficult to realize the possible havoc which the failure of a single irrigation reservoir might cause, and the extent to which the maintenance of communication along the lines

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of railway in this Presidency is contingent upon the security of every one among a thousand such reservoirs. It may be deemed fortunate that the bursting of this Chintagoonta tank occurred while communication was otherwise interrupted owing to the failure of the large bridges.

No time was lost in executing the necessary repairs, and on the 17th November the running of trains was resumed over this part of the line, after an interruption of eighteen days. The cost of repairing the damage is set down at about Rs. 3,800.

(Signed) J. H. M. SHAW-STEWART, Lieut.-Col., R.E.,
Consulting Engineer for Railways.

No. 283. ORDER THEREON, 12th February 1875, No. 395.

RAILWAY, No. 43.

THESE papers will be forwarded for the information of the Government of India and the Secretary of State, in continuation of former reports.

2. His Excellency the Governor in Council notices with pleasure the testimony borne by the Consulting Engineer to the vigilance of the Madras Railway staff, to which, under Providence, must be attributed immunity from accident during the disastrous period of the floods. The rapidity with which communication was restored along the North-West Line is noticed by the Consulting Engineer. The Government have already mentioned with approval the exertions of Mr. Carter contributing to this result, and they desire now to express their appreciation of the efficient service rendered by the officers in charge of the large bridges on the North-West Line.

3. The narrative of damages caused to works within the scope of the charge of the Chief Engineer for Irrigation will be separately disposed of on its receipt from that Officer, in compliance with G. O., No. 3,411-A, dated 4th December 1874.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,

Secretary to Government.

No. 284.

(DOCKET No. 396, dated 12th February 1875.)

Copy of the above forwarded to the Government of India, in continuation of docket No. 3,492, dated 12th December 1874.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

Ed. S. T. Austin.
Spare Copies

Railway Department.

CONSULTING ENGINEER'S OFFICE.

From

LIEUT.-COLONEL J. H. M. SHAW STEWART, R.E.,

Consulting Engineer for Railways,

To

COLONEL G. W. WALKER, R.E.,

Secretary to Government,

Public Works Department.

Fort Saint George.

SIR,

In compliance with the instructions contained in the order of Government dated the 4th ultimo, No. 3411 A, I have the honour to submit a detailed statement of the injury sustained by the railways in this Presidency during the floods of September and October 1874. The statement shows the nature and extent of damage done to every work which suffered from the floods, and the cost of the necessary repairs. Cases of trifling injury to the earth-work and ballast have been omitted. In some instances it is not

not at present possible to state, even approximately, the cost of securing the railway against the effects of floods of such exceptional magnitude as were encountered during last year. I refer to such works as the bridge over the Perambay on the Bangalore branch, and the bridges over the Chygai and Paupugree on the North-West line; in which cases it is almost certain that additional waterway will be required.

2. The area over which the effects of the floods were felt was extensive. With regard to the Madras Railway the western limit seems to have been;— on the South-West line, the 145th mile, about midway between the Tripatore and Pamulputty stations;

on

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in the Bangalore branch, the 204th mile, near the Badjody station;— and on the North-West line, the 234th mile, midway between the Tadpatre and Rajalcheruvu stations. Upon the South Indian Railway, the only portion of the open line which suffered was the short branch between Arcum and Bangalore but the works under construction on the Madras-Bangalore line were also considerably retarded by the heavy rains. The floods from which the railways suffered the greatest injury seem to have been caused by extraordinary heavy rains in the southern taluqs of the Cuddapah and Bellary District and in the eastern part of the Mysore Territory. Over this area the rainfall during September and October seems to have averaged more

more than 30 inches; and it must
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after unusually heavy rains during
the earlier months; and that in
most places the soil was saturated
and the reservoirs filled before the
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In some instances the disas-
trous effects of the heavy rainfall
were aggravated by the bursting of
large reservoirs. Among these may
be mentioned the Holali and
Qasottah tanks in Mysore, the
Chintaganta tank in Gundlupet,
and the Dhurmaswami tank in
Bellary. There is also reason
to believe that the destructive
flood in the Geriattim river
was due in great measure to the
bursting of large reservoirs within
the Paungasser Zemindari; but
the effects of the heavy rains in
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3
this and other private estates have
not yet been ascertained.
3. With regard to the loss
resulting from these floods, I
have arrived at the conclusion that
the cost of repairing the damages sus-
tained by the open lines will be
covered by 3 lacs of rupees. It is
not easy to form an accurate es-
timate upon this point, inasmuch
as the milking material on the
North-West line is of great value,
and it is uncertain how much of
it will ultimately be recovered and
found fit for use: but after
careful consideration the above is
the figure at which in my opinion
the cost of repairing the damaged
works may fairly be set down.
The loss sustained upon works under
construction may be estimated at
about Rs. 50,000, giving a total
of

of Rs. 3,50,000. To this should be added the loss arising from the interruption to traffic, an item by no means easy to arrive at; but by careful comparison between the receipts during the period affected by the interruption, those for the period immediately preceding it, and those for the corresponding period in 1873, a falling off of $2\frac{1}{2}$ lacs is arrived at, which may not improperly be charged to the effects of the floods. It may therefore be roundly stated that, under the head of repairs and loss of traffic, the loss caused to the State by these floods, so far as the railways are concerned, amounts to six lacs of rupees; without taking into consideration the provision of additional waterway which the experience of 1874 may show to be necessary.

4. In submitting this report there are two points connected with these disasters to which it is my duty to draw special attention. One is that, in the midst of all these calamities, occurring at widely distant points over such an extensive area, no instance of an accident to a train has occurred; and the fact that the lives and limbs of passengers have been preserved from injury may fairly be placed to the credit of the Railway Staff, especially the line watchmen, a body of men who have not always distinguished themselves on similar occasions, but whose conduct during the recent floods is in my opinion deserving of high praise. The other point to which I desire to draw attention is the rapidity with which the temporary repairs have been executed, and communi-
-cation

cation restored along the line. In the case of the Geriatum bridge the exertions of M. Barker, the Engineer in charge, have already received recognition from Government; but the work done by the Officers in charge of the large bridges on the North-West line deserves special mention. In the cases of the Cheyair, Paupugnee, and Chittrautti rivers, the immediate repair of the damaged bridges was out of the question, and the construction of temporary roads across the beds could not be begun until the water in each river had subsided. The road across the Cheyair was completed by M. West on the 16th instant, and the roads across the Paupugnee and Chittrautti were completed by M. Paworth on the 18th, on which

10/ 5
which date through traffic between Madras and Paichere was resumed. It is with pleasure that I am able to bear witness to the exertions made by these Officers in order to insure this result. The obstacles which they had to encounter were not slight.

I have the honour to be
Sir
Your most obedient servant
M. M. M. M.
Lieut. Col. R. S.
Consulting Engineer for P. & F.

Madras
22nd January
1875
H. B. B.

Detailed statement of the injury caused to the Railways in the Madras Presidency by the floods of September and October 1874.

no bank No
margin - 8.7.74
being out - the
only for

No Railway
Bangalore
Branch
204 mile.

Upon the 17 September, the large stream which is crossed by the Madras Railway near the Badgoody station on the Bangalore branch rose to an unusual height, and carried away a masonry 6 feet culvert, situated near the 204 mile. The railway embankment was washed away for a distance of about 8 feet; and the bridge over the main stream, consisting of five 30 feet arches, was for a time in some danger. The stream

Calcutta 29.12.82	29.12.82
60.322-25.54.74	07.18.75
744-30.7.74	
289-3.10.74	
285-6.11.74	
245-15.11.74	
574-9.11.74	
3288-12.11.74	
3217-18.11.74	
3268-19.11.74	
3275-19.11.74	
3280-19.11.74	
3281-20.11.74	
3287-20.11.74	
3241-21.11.74	
3245-21.11.74	
3411-4.12.74	
3465-9.12.74	
3459-9.12.74	
3418-4.12.74	
3441-2.12.74	
3441-8.12.74	
3441-15.12.74	

To
The Secretary to Government
P. W. Department
Fort Saint
for
The Consulting Engineer
Railway Department
No: 2181
Dated 22nd Dec 1874
Recd 25th Dec 1874
No. 56.

Calcutta 29.12.82

Submitted
a detailed statement
of the injury caused
by the Railways in
the Presidency by
the floods of
September and
October 1874.
No. 56. 1874. 12-29

is known indifferently by the names of Panar, Pennar, and Penankeny; while near Cuddalore, where the South Indian Railway crosses it, it is known as the Poorniar.

A temporary bridge, consisting of two 30 feet girder openings, was erected in the gap; and communication was restored upon the 28th September, having been interrupted for 12 days.

The sudden rise in the river seems to have been due solely to excessive rain, and inquiries are still being made in order to determine whether the provision of waterway is sufficient.

Upon the 17th October this bridge was again in service.

danger, as fears were entertained for the safety of the Coos-cottah tanks. In order to save the bridge, a breach was cut in the railway embankment, and was closed again on the 18th, when danger had passed.

The expenditure incurred in these operations has been Rs 1434; but until the question of waterway has been settled, it is impossible to state what outlay may be necessary to provide against similar contingencies.

M. Railway 2
S. W. Line
133rd to 145th
mile.

Upon the 28th September considerable damage was caused to part of the South West line, between the 133rd

and

and 145th miles, by the breach-
ing of several tanks near
Chitalore in consequence of the
heavy rain. The floors of a
15 feet arch in the 135th mile, and
of a 20 feet arch in the 144th
mile, were carried away. Two
3 feet arches in the 135th mile
also sustained damage; and in
the 136th mile the entire ballast
was washed away for a consider-
able distance, leaving the rails
suspended.

The cost of repairing
this damage amounted to Rs. 1798.

3 Upon the 24th October
considerable damage was caused
to the short line between Arcunum
and Congeveram, now forming part
of the South Indian Railway
S. I. Railway
Congeveram
line.

131/8
system. In the 3rd mile the
wing walls and flooring of a bridge
of two 14 feet girder openings were
carried away; and at the Cortel-
liar bridge where the water rose
to the bottom of the girders, the
approaches sustained some injury.
In the 14th mile, a bridge of
three 14 feet openings was des-
troyed. In the 6th and 7th
miles there were numerous
breaches in the railway em-
bankment; and throughout
the line the ballast suffered
severely.

Communication was
interrupted from the 24th Octo-
ber until the 4th November.

The cost of repairing
the damage has been Rs. 1384-; but it will probably
be

be found necessary to incur
further expense in increased
waterway with a view to provide
against similar disaster in
future.

4. Upon the 24 and 25. ^{N. York Line} Mc Railway
October the old bridge over the 136 mile.
Cheyar sustained considerable
damage. This bridge consist-
ed originally of thirty-eight
70 feet openings spanned by
wrought iron girders resting on
masonry piers. It was divided
into two unequal portions by
an island embankment about
200 yards in length. During
the flood in October 1870 seven
piers in the south portion of the
bridge were carried away; and,
pending the construction of the
new bridge which was ~~thereby~~
decided

14✓ 9
decided on, these were replaced
by eight piers formed of screw
piles. During the night of
the 24. October 1874 the water
in the Cheyar rose to an unpre-
cedented height; the masonry
piers were topped, and the lower
plates of the girders submerged.
The damage sustained by the
bridge may be thus summaris-
ed:— one masonry pier in the
south portion, and four in the
north portion destroyed; the
two abutments of the island
destroyed, and about 80 yards
of the embankment between
them carried away; two
screw pile piers in the south
portion forced slightly down
stream; and two sets of iron
girders

girders, 140 feet in length, carried away. Some idea of the great force exerted by the current may be gathered from the fact that these sets of girders, each weighing about 27 tons, were found imbedded in the sand, the one about three-quarters of a mile, and the other about a mile and a half, below the bridge.

After the occurrence of the accident to this bridge in October 1870, its foundations were examined and condemned, and the construction of a new bridge was determined on. There can be no doubt that the damage now reported was due solely to the effect of a tremendous scour upon insufficient foundations. That the flood in the river, and its

effects, were quite out of the ordinary course, will be seen from the following statistics of the rainfall taken at different points within the Cheyair basin:—

Stations at which rainfall was registered.	Rainfall in inches during			
	Sept. 1874.	Oct. 1874.	Sept & Oct. 1874.	23 rd 24 th and 25 th Oct. 1874.
Montimistha—	17.42	17.34	34.76	13.90
Pallumpett—	9.44	25.48	34.92	22.95
Goolcherroo—	15.65	15.57	31.22	13.40
Peelair—	10.80	18.60	29.40	13.80
Madanapilly—	13.60	16.50	30.10	6.55

The screw pile piers which are stated to have been forced slightly down stream, rested on rock, at a depth of about 17 feet. In such a comparatively shallow bed

of sand the use of screw piles was resorted to upon economical grounds, only as a temporary measure, pending the completion of the new bridge.

It is now proposed to rebuild for a single line of rails, the masonry pier which was carried away in the south portion of the bridge; to replace the four fallen masonry piers in the north portion with screw piles; to form the south abutment of the island by supporting cross girders upon the uninjured wing-walls of the old bridge; to replace the north abutment of the island with screw piles; to replace in their proper position the screw pile piers which were forced down stream; and to substitute

15 11
substitute new girders for those carried away. It should be understood that these are all temporary measures intended to prevent interruption to the traffic during the construction of the new bridge. It is expected that these repairs will be finished by May 1875, and in the interval trains pass along a temporary road laid across the bed of the river. This temporary road was opened for traffic upon the 14th instant, communication having been interrupted since the 24th October, for a period of 82 days.

The estimated cost of the repairs to the old bridge amounts to £61,072; but it must be observed that in this

is included an item of Rs 27,489 for new girders; and that this sum, or part of it, will be credited to the estimate if the missing girders are capable of future use. The cost of the temporary road across the bed of the Cheyair is estimated at Rupees 3,000.

5. The new bridge across ^{N. Railway} ^{N.W. Line} the Cheyair, now under construction, ^{13 1/2} mile. was also somewhat injured upon the 24th & 25th October 1874. This bridge was designed to consist of forty-six 70 feet openings, spanned by wrought iron girders; the island embankment, which divided the old bridge, being removed. The two abutments and thirteen of the piers, are of masonry; the other piers being formed of cast iron cylinders

12
cylinders sunk through the sand into the rock. The whole of the masonry, according to the original design, has been completed; and it is satisfactory that it withstood, securely and without injury, the unprecedented floods of last year. Of the cylinder piers, in Nos. 14 both cylinders have bent over down stream, making an angle of about 15° with the vertical. In pier No. 22 the east cylinder, and in No. 24 the west cylinder have also bent over, but more slightly. These cylinders had been sunk through the sand to rock, but they had not been imbedded in the rock, and had not of course been filled with concrete.

During the late floods the bed of the river was greatly disturbed

disturbed, and its outline has been altogether changed; a large quantity of material being buried deeply in the sand. It is hoped that much will be recovered; but still the loss under this head will probably be considerable, as large heaps of material prepared for making concrete were swept away.

It is estimated that the cost of repairing the damage sustained by the bridge will amount to about \$7,500. The value of the material buried and carried away is about \$20,000; but it is hoped that most of this may be recovered.

The question of providing additional waterway is under consideration. It will probably

No. Railway
N.W. Line
13.5 mile.

132/ 13
probably be necessary to add two openings at the south end of the bridge, and to raise the piers by about three feet. This will of course increase the cost of the new bridge; but to what extent cannot now be stated.

b. The damage occasioned by the flood in the Cheyair was not confined to the old and new bridges. The river spread far beyond its usual banks, and the approaches to the bridge, both north and south, were considerably injured. On the south side the flood water was carried across country and along the railway embankment for nearly a mile, forcing its way over the bank in the 13.5 mile, where the line was completely obliterated for

for a distance of about 200 yards, fortunately without injury to any masonry work.

The cost of repairing this damage was Rs. 3237, and the work was completed by the 12th November, communication having been interrupted over this part of the line for 19 days.

7. Upon the 24th and 25th October the line to the south of the Chyaur was also severely damaged in consequence of the heavy rains.

16. Railway
N.W. Line
71st to 132
mile.

In the 71st mile the revetment round the screw pile abutment of a 50 feet girder bridge slipped, as well as part of the embankment. This was roughly repaired upon the same day. In

14
In the 82nd mile the north-west wing-wall of a 9 feet arched bridge was carried away, and the slope of the embankment scoured. A temporary diversion of the line was immediately made.

In the 86th mile the line runs through the Kurumbady tank, and some considerable slips occurred in the railway bank, which were however filled up on the same day.

In the 97th mile there was a heavy stream flowing through the Ballapilly cutting. The water was 2 feet deep, and the ballast was carried away, but the damage was soon repaired.

In the 107th mile the embankment was seriously injured for

for a distance of 500 yards by the bursting of a tank. In one place the bank was entirely swept away for 20 yards.

In the 108th mile there was a bad slip in the bank behind the south abutment of the Codoor bridge, but this was soon repaired.

In the 131st mile a breach of 70 yards in length was made in the railway bank close to a 12 feet arch. This breach was caused by the bursting of the Munnor Ketchemah tank, which lies close above the line. Communication over this breach was not restored until the 12th November, after an interruption of 19 days.

In the 132nd mile the bank

No. Railway
N. 4th Line.
175 mile.

15
bank was much damaged in consequence of a second breach in the Munnor Ketchemah tank. The water flowed over the line, and left gaps of from 10 to 30 yards in length. The flood from the tank was increased by some breaches in a neighbouring channel; but fortunately none of the masonry works were injured. The running of trains over this part was also resumed on the 12th of November.

The cost of making good the injuries enumerated above amounted to Rs 1620. The bridge over the 8. Paupagnee was greatly damaged by the flood in that river upon the 24th and 25th October. This bridge

bridge originally consisted of twenty
70 foot openings, spanned by wrought
iron girders resting on screw pile
piers, the abutments being of ma-
sonry. One pier and one set of
girders were seriously injured by the
accident to the inspection train in
June 1874, and the damage was
temporarily repaired with short gir-
ders supported on piers of wooden
sleepers. The floods of October
carried away four screw pile piers,
with two sets of 140 foot girders
resting on them; and the tempo-
rary piers of wooden sleepers were
also swept away. None of the
screw piles or girders have yet been
discovered, although careful search
has been made. The probability
is that, as in the case of the
Cheyair

21/10
Cheyair, the girders have been
carried to a great distance down
stream, and that the piles will be
found deeply buried in the sand
near the bridge.

There can be no doubt
that the damage sustained by this
bridge arose from the insufficiency
of the waterway to pass off with
safety a flood of such exceptional
magnitude. During nine years
the bridge withstood all the floods
in the river, some of which were
very heavy; but the rainfall in
October was quite extraordinary;
and the water, stopped in its course
by the railway banks, seems to have
spread over the country to a width
of fully three miles. The result
was a tremendous scour in the
sandy

sandy bed at the bridge, carrying away the piles, which had been screwed down to the rock, at what was deemed a perfectly safe depth.

Communication across the Paupugnee was restored upon the 18th instant, having been interrupted since the 24th October, a period of 85 days. For the present, trains run over a temporary road laid across the river bed, the cost of constructing which has been about Rupees 3000.

It is now proposed to restore all the screw pile piers which suffered, and to replace the missing girders. The estimated cost amounts to Rs 71,616; but it should be observed that this

17
this sum includes the cost of repairing the damage sustained by the bridge during both June and October. It also includes items, amounting to Rs 54,744, for new girders and new piles to replace those not yet recovered from the bed of the river; and it may be expected that the estimate will ultimately be credited with a large part of this. The question of an increase to the waterway remains for consideration. There can be no doubt that the bridge, as it stands, is insufficient to cope with floods of such exceptional character as that which it encountered in October. If it be determined that

that provision is to be made against such extraordinary casualties, it will probably be found advisable to rebuild the bridge, a measure which will necessarily be very costly.

9. The flood in the Paupugnee which, as above stated, spread over the country for a width of three miles, inflicted considerable injury upon the railway embankment south of the bridge. In the 174th mile two 6-foot culverts suffered, one being completely washed away. Breaches were also made in the embankment in the 174th and 176th miles.

The cost of repairing these damages has been about
Rupees

N. Railway
N.W. Line.
2 1/2 mile.

N. Railway
N.W. Line.
1 7/4 mile.

Rupees 2,700.

10. On the 25th October the bridge over the Chistramuddy sustained very serious injury. It consisted of forty 70 feet openings, spanned by wrought iron girders. The abutments and ten piers at each end were of masonry, the remaining nineteen piers being formed of screw piles. The masonry piers were founded either upon hard clay, or on brick wells carried down into the clay. The flood of the 25th October carried away nine of the ten masonry piers near the south abutment. Two sets of 140 feet iron girders have disappeared, and two sets have been much twisted and damaged.

damaged.

The damage appears to have been solely due to the inefficiency of the foundations to withstand the scour caused by the extraordinary flood.

The Chief Engineer of the Company was on the spot while the flood was at its height, and he describes it as something quite beyond the range of his experience. Not only was the river full from bank to bank, but, from some cause or other, the current seems to have set across the bed from north to south. When the subsidence of the water in the river allows the foundations to be examined, it will perhaps be

be more easy to form a satisfactory opinion as to the cause of their failure. So far as can be ascertained, the flood in the river was caused not only by the heavy rainfall but by the bursting of large tanks in the Bellary district.

It is proposed to replace all the ruined piers with screw piles, and to substitute new girders for the missing and damaged ones. The cost is estimated at Rs 1,10,746; but in this is included an item of Rs 57,298 for new girders, and it is expected that a large part of this will ultimately be credited.

In the mean time communication

communication has been restored by the construction of a temporary road across the river bed; the cost of which has been Rs 3,000. The running of trains was resumed upon the 18th instant, after an interruption of 85 days.

11 Upon the 25th October the bridge over the Pennair was also damaged. It consisted of twenty-four 70 feet openings, spanned by wrought iron girders resting on masonry piers and abutments. The masonry was founded either upon hard kunker, or upon brick walls carried down to the kunker. The October floods destroyed two piers near the north abutment, but fortunately without injury to the girders; temporary piers of wooden sleepers

N. Railway
N.W. Line
23 1/4 mile.

20

sleepers having been erected, traffic over the bridge was resumed upon the 14 December, after an interruption of 50 days.

In order to restore the ruined piers without interfering with the running of trains, it has been decided to sink five screw piles in a row on either side of each of the two temporary sleeper piers, the rows of piles at each pier being 24 feet apart. Two pairs of 26 feet girders, resting upon the piles, will support the main girders of the bridge; and the sleeper piers will then be removed, so as to allow the new masonry piers to be built while trains are running over the bridge.

The

The estimated cost amounts to Rs. 10,762; and the cost of the temporary repairs came to about Rupees 3,000.

The failure of the two piers in this bridge seems to have been due to the same cause to which the destruction of the Chittravutti piers has been attributed, namely, the insufficiency of the foundations to cope with the tremendous scour. No trouble was spared to carry the foundations down to what was supposed to be a safe depth; and it now remains a question for consideration whether it is necessary to adopt measures for protecting the foundations.

12. The temporary bridges near Nailputty and Vanimbady, which

N. Railway
S.W. Line.
106 and
124 mile.

9/5/21
which were constructed to carry the traffic during the rebuilding of the two bridges destroyed early in May 1874, were damaged by the heavy rains of the 25. October and rendered impassable for trains.

The damage was at once repaired, at a cost of Rupees 475; and communication across the temporary bridges was restored upon the 28. October, after an interruption of 4 days.

N. Railway
S.W. Line.
98 mile.

13. Upon the 26. October the bridge over the Goriattum was severely damaged. It consisted of two portions divided by a small island embankment about

about 50 yards in length. The eastern portion consisted of twenty-four 30 feet arches on a skew of 60°, and the western portion of five 30 feet arches on the square. These five arches were entirely destroyed upon the 26 October, and it is now proposed to rebuild them, and to replace the island embankment by two 30 feet arches and one irregular opening spanned by wrought iron girders, uniting the square and skew portions of the bridge. The estimated cost is Rs 42,111; but the actual expenditure entailed by the accident is considerably below that sum.

Upon

22
Upon the recommendation of the Committee appointed by Government to examine the foundations of the Madras Railway bridges, a sum of Rs 80,449 was sanctioned during 1873 for the construction of certain protective works at the Coriattum bridge. During 1874 the weather was singularly unfavourable for carrying out such works in the beds of rivers, and the floods of last October found the western portion of the bridge entirely unprotected. In rebuilding the bridge, it is intended to carry the foundations down to

to rock, and a large part of the sanctioned protective works will thus be rendered unnecessary. It is expected that this will effect a saving of Rs 18,133; so that, in estimating the cost of the damage caused by the flood, the actual expenditure incurred in rebuilding the bridge may be reduced by that sum, leaving Rs 23,978 as the cost of restoring the bridge, and of providing 100 feet of additional waterway.

Communication across the river was temporarily restored on the 5th November, after an interruption of 11 days, by constructing

23
constructing piers of wooden sleepers, and spanning the openings with short girders. The cost of this amounted to Rs 6,100. A temporary road has been subsequently constructed across the entire bed of the river, at a cost of Rs 2,500, in order to allow the permanent restoration of the bridge being proceeded with. This temporary road was opened for traffic upon the 8th instant.

14.
M. Railway
A. W. Line
196 to 200
mile.

Upon the 30th October, four miles of the railway lying immediately to the north of Mordanoor station were breached in many places and

and rendered completely im-
passable, in consequence of the
breaching of the Chontagoonta
tank, a large reservoir lying
to the west of the line. This
tank was known to be in a
dangerous state, and prepara-
tions had been made for reliev-
ing it by cutting the bund;
when, suddenly, on the night
of the 30th October it gave way,
and its contents rushed over the
country and across the railway
at numerous points between the
196th and 200th mile. The prin-
cipal outlet from the tank is
crossed by the railway within
the Moodanoor station yard,
by

indicated
on map of the
District

24
by a bridge of three 30 feet gir-
der openings; and at this point
the railway bank had been
cut, as soon as the tank was
known to be in danger, in the
hope of saving the bridge. The
measure was fortunately success-
ful; and all the other masonry
works within the four miles
affected by the inundation were
in like manner saved
from destruction by the water
finding its way over the rail-
way bank in all places. But
with the exception of the
bridges and culverts, the
whole of the railway within
those four miles may be
said

said to have been swept away;—
ballast, earthwork, and fencing;—
the rails being carried in some
places to a distance of 9 and
10 yards from where they had
been placed. For those who
had no opportunity of seeing
this part of the railway before
the completion of the repairs,
it would be difficult to realise
the possible havoc which the
failure of a single irrigation
reservoir might cause, and
the extent to which the main-
tenance of communication
along the lines of railway
in this Presidency is contingent
upon

25
upon the security of every one
among a thousand such reser-
voirs. It may be deemed for-
tunate that the bursting of this
Chentagomta tank occurred
while communication was ^{otherwise} in-
terrupted owing to the failure
of the large bridges.

No time was lost in
executing the necessary repairs,
and on the 17. November the
running of trains was resumed
over this part of the line, after
an interruption of 18 days. The
cost of repairing the damage
is set down at about Rs 3,800.

Mumtaz Hussain M.C.

Secy for Railways

Secy
Bent.

By Secy Engrs 27/12-Ex. by Secy 27/12

M. 484/75
G.O. 395-12-2-75

Printed by

P. W. D.

Proceedings of the Madras Government,

Under date the

187

Read the following:—

From the Engineer
for Railways } C.O. No 56 of 25th Jan'y 1875

These papers will be
forwarded for the information
of the Government of India
and the Secretary of State
in continuation of former
reports.

2. His Excellency the
Governor in Council notices
with pleasure the testimony
borne by the Engineering
Officers to the vigilance
of the Madras Railway
Staff, to which, under
providence, must be at-
tributed immunity from

Md
27/11

L.S.
27-1

By

accident during the dis-
astrous period of the floods.

The exertions of the Engineers
in restoring communication
are ^{also} deserving of special
Commendation.) The fact

3. The narrative of damages caused to books within the scope of the Charge of the Chief Engineer for Irrigation, will be separately disposed of on its receipt from that Officer, in compliance with L.O.

N.S. № 24

Copy of the above
forwarded to the Government
of India in continuation
of

I am very
The rapid growth
which the committee
now restore along the
of the timber land is interesting to
have already ^{mentioned} ~~mentioned~~

are also ^{present} ~~present~~
with approval the election
of Tucker as president of
the Board and the
Board have ^{expressed} ~~expressed~~
their approval of the
present course ^{and} ~~and~~
of the Officers ^{and} ~~and~~
the ^{large} ~~large~~ body
in the ^{of} ~~of~~ the ^{of} ~~of~~ the

Care Inspector
Ch. E. J. J. J.

of docket No. 3492 dated
12th December 1874.

Lyman

32

*Recd
C. W. C.*

P. W. D.

Proceedings of the Madras Government,

Under date the

187

Read the following:—

From

The Comptroller for Railways. (H. R. No. 56 dated 22 Jan'y/75)

These papers will be forwarded for the information of the Government of India and the Secretary of State in continuation of former reports.

His Excellency the Governor in Council notices with pleasure the testimony borne by the Consulting Engineer to the vigilance of the Madras Railway Staff to which, under providence, must be attributed.

immunity from accident during the disastrous period of the floods. The rapidity with which communication was restored along the North West line is noticed by the Consulting Engineer. The Government have already mentioned with approval the exertions of Mr Carter as contributing to this result, and they desire now to express their appreciation of the efficient service rendered by the Officers in charge of the large bridges on the North West Line.

3 The narrative of damages caused to works

29
within the scope of the charge of the Chief Engineer for Irrigation will be separately disposed of on its receipt from that Officer in compliance with G.O. No 3411 A dated 4th December 1874.

1875
179
Cous. Eng. for Rep. S.
Ch. Eng. for Dir. S.

50
4

Staff-13-2-75. R.E. No 9

Copy of the above forwarded to the Government of India in continuation of docket No 3492 dated 12th Decr 1874.

G.M.

60
a

Staff-13-2-75 with
800 paces of

Recd. & to Encl. of 12 Feb'y
1875 -

484
Govt. of Madras
PUBLIC WORKS.

The Comptroller
Genl. of Accounts
Madras

Dated 12 Feb'y 1875, No. 395
396

No. 282-284.

Damages - (P)

Forwarding copy of
Proceedings passed on
letter from the Comptroller
for submitting a detailed
statement of the damages
caused to the Railways
in the Madras Presy
by the floods of Sept'r
& Oct'r 1874 -

The ~~statement~~ detailed
statement submitted by
the Comptroller of the
Railways caused to the Railways
in the Madras Presidency
by the floods of Sept'r
& Oct'r 1874 ordered to
be forwarded to the
information of the Govt of
Madras & the Secy of State